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Animal welfare science and anthrozoology.

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Both animal welfare science and anthrozoology have active researchers from several different academic disciplines. Some started in animal behaviour research, as I did, whilst others have come from psychology, physiology, practical veterinary or medical work, social science etc. All have been influenced by the writings of philosophers about attitudes to animals and most analyse both data and ideas rigorously. For many people, such as the members of the research group that I started in Cambridge Veterinary School in 1986, the motivation for doing such work has been to understand the biology better and to be able to help to improve the welfare of animals and the benefits that people get from interactions with companion animals. During the last 24 years there has been a great increase in public interest in the area. Our Centre for Animal Welfare and Anthrozoology has been much in demand from students and from researchers around the world for lectures and courses.

Animals have always had good or poor welfare and there have always been people who cared for and considered the welfare of animals but animal welfare as a scientific discipline has emerged in the last thirty years. It now flourishes because of public concern. Animal health has been studied for much longer and laws protecting animals have existed in Europe for two hundred years. Health is an important part of the wider concept of welfare and concerns how well individuals cope with pathology while welfare refers to coping with the environment as a whole. The change that started to occur in the 1980s was from a focus on human actions to protect animals, to the animals themselves as individuals, their biological functioning and how to provide for their needs. Consideration of this functioning had to include the brain of animals and how it controls behaviour, physiology and defences against disease. Animals have a range of needs and those of each species can be studied in carefully controlled investigations. The first step in any report, legislation or code of practice is to list the needs of the animals involved. Hence the concept of needs is included in modern legislation and has replaced the earlier and less precise list of freedoms that animals should have.

Concepts such as those of welfare, stress, health, needs, pain and other feelings were not well defined in the scientific literature thirty years ago. It has been important in the development of animal welfare science for usable definitions to be produced and this has been one of my aims. Another aim has been to develop measures of welfare. Measurement has to be on a scale of good to poor welfare and many indicators have been documented in scientific papers. The welfare indicators had to be different for short-term problems, such as those during handling, transport, painful events or slaughter, and for long-term problems such as those resulting from housing conditions, genetic selection or long-lasting treatment methods. There have been descriptions by the author and colleagues of abnormal behaviours such as stereotypies

in confined calves and sows, weak bones in battery-caged hens and confined sows, and measures of heart-rate, adrenal hormones, impaired meat quality, immunosuppression, and increased mortality as indicators of welfare during transport. Work by Shusuke Sato, Seiji Kondo and other Japanese animal welfare scientists have also contributed to our knowledge of scientific indicators of welfare.

A key issue in the understanding of animal welfare and its investigation has been the study of motivation in animals. An animal's strength of preference for a resource can be measured, as Ian Duncan, Marian Dawkins and Lindsay Matthews have emphasised, and recent work by Richard Kirkden and the author has refined this methodology. We can find out what resources animals will work hard for using sophisticated studies of how strongly animals prefer or avoid. However, this technique has hardly been applied to companion animals. How hard will the various animals kept as pets work for contact with humans? I suspect that pets of some species would work hard but others would work to avoid human contact. This should be a major research area.

In parallel with studies of welfare, our knowledge of the cognitive ability and level of awareness of domestic and other animals has improved substantially in recent years. The concept of sentience has developed and farm and companion animals are now specified as sentient in a European Union Treaty. They have to be treated as individuals rather than just as possessions or 'animal machines' as Ruth Harrison put it in her 1964 book. Research on learning, cognitive ability, feelings and levels of awareness have altered the values placed on animals by scientists, animal users and the public. The late Ron Kilgour in New Zealand demonstrated that the maze-learning abilities of cattle, sheep, goats and pigs are superior to those of a variety of companion and laboratory animals. Work by the author and colleagues shows that sheep, pigs and cattle have very complex social behaviour, cattle can show an excitement response when they learn to solve a problem, the eureka effect, and that pigs can rapidly learn to appreciate what they see in a mirror. Dogs can learn tasks that involve evaluation of human behaviour and emotional responses to it.

Some publicly observable events where animal welfare was very poor, for example the keeping of pregnant sows in small stalls, the deaths of large numbers of sheep on ships travelling to the Middle East, or the killing of poultry for disease control by putting them in plastic bags and burning them, were reported on the front pages of many newspapers in European countries. The importance of animal welfare to the public and the power of consumers, who as a result refused to buy any goods from particular countries, has now been realised by politicians, state veterinary service staff and some in the animal production industry. Those who use animals for sport, entertainment, working including assistance to people, or as companions have sometimes been slower to realise that the public concern about animal welfare extends to these animals as well as to those on farms or in laboratories.

Like animal welfare science, anthrozoology is a relatively young subject. Many of us in these areas have encountered the situation where academic researchers asked about our research area but did not believe that it is a real subject. Although it has long been acceptable to say that you work on social behaviour of animals or of humans, many do not think that studying social interactions between humans and other animals is an academic discipline. Much of the credit for helping to establish the scientific

credentials are due to a small group of pioneer researchers and to the Editor of *Anthrozoos*, Dr Anthony Podberscek, whose academic rigour has had much beneficial influence.

The study of interactions between companion animals and humans in Cambridge started with the research of Dr James Serpell. James joined our research group in 1988. He rapidly established himself as a careful investigator of human attitudes to animals and an experimenter who could examine the effects of pet animals on human health and the effects of humans on animal welfare. He continued this work when he moved to Philadelphia. I was happy to facilitate this work, help to advise group members and promote the studies of Elizabeth Paul, who later moved to Bristol, Anthony Podberscek and Irene Rochlitz. Their work on factors affecting attitudes to animals, human benefits from companionship and the welfare of cats and other companion animals was complemented by Barbara Sommerville's work with me on olfactory communication and awareness. The development of the concept of sentience was supported in part by the close liaison between animal welfare scientists and anthrozoologists in Cambridge and elsewhere.

A problem in anthrozoology research has been the bias of some of the funders. Those who work for veterinary pharmaceutical companies do not want to hear negative consequences of use of their drugs and pet food companies do not want to get evidence that pets have some negative effects on humans or that the welfare of pets is sometimes very poor. Researchers in the area have a responsibility to be accurate in their research and to report results that might be unpalatable to sponsors. Research on the welfare of animals used as companions or as assistance animals should be carried out. Much care should be taken in any study that could reveal positive or negative effects of pets on their owners as pet owners tend to report positive rather than negative effects. The researchers must be objective.

My hope for the future is that there will be much more precise research on: how to improve the welfare of animals, what are the abilities of animals including fish and invertebrates as well as birds and mammals, and what are the real effects of animals on people and of people on animals. Well-conducted investigations will promote the academic status of the researchers, further establish the academic disciplines and increase the extent of moral action in the world.

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